Sampling Episode Report
Holland America Veendam
Sampling Episode 6503

Chapter 1
Introduction

March 2006

1.0 INTRODUCTION

This Sampling Episode Report describes the Environmental Protection Agency's sampling and analysis activities to characterize graywater and sewage generation and treatment by Holland America Line's cruise ship ms Veendam (Veendam) while in Alaska waters. This sampling episode took place from June 20 through June 25, 2004, under the direction of the Engineering and Analysis Division of the Office of Science and Technology, and the Oceans and Coastal Protection Division of the Office of Wetlands, Oceans, and Watersheds of the U.S. Environmental Protection Agency (EPA).

The Veendam is a 55,451 gross-ton cruise vessel launched in 1996. The vessel has 10 decks, a length of 720 feet, and a beam of 101 feet. The Veendam's maximum cruising speed is 22 knots. Its port of registry is Nassau, Bahamas. During the sampling episode, the Veendam carried approximately 1,300 passengers and 520 crew. The ship's itinerary was as follows:

Date	Port
June 20, 2004	Seward, Alaska
June 21, 2004	Cruising College Fjord
June 22, 2004	Cruising Glacier Bay
June 23, 2004	Sitka, Alaska
June 24, 2004	Juneau, Alaska
June 25, 2004	Cruising Inside Passage
June 26, 2004	Vancouver, BC

This sampling episode is part of EPA's data collection efforts to evaluate whether to develop wastewater discharge standards for cruise vessels authorized to carry 500 or more passengers for hire when operating in the waters of the Alexander Archipelago or the navigable waters of the United States within the State of Alaska or within the Kachemak Bay National Estuarine Research Reserve (hereafter referred to as Alaska waters). Such regulations are authorized by "Title XIV - Certain Alaskan Cruise Ship Operations" of the Miscellaneous Appropriations Bill (H.R. 5666) passed by Congress on December 21, 2000, in the Consolidated

Appropriations Act of 2001 (Pub L. 106-554, Sections 1401-1414, 33 USC 1901 Note). The data and information gathered through this sampling episode were collected using EPA's authority under section 308 of the Clean Water Act, as also provided by Title XIV. Holland America Line voluntarily provided information and data gathered for and represented in this report, notwithstanding the above cited authority, in the interest of research for the improvement of wastewater treatment standards.

EPA selected the Veendam to characterize the performance of the Zenon Environmental Inc. (Ontario, Canada) membrane bioreactor treatment system (Zenon treatment system), an advanced wastewater treatment system that uses aerobic biological oxidation followed by ultrafiltration, using the proprietary ZeeWeed® membrane technology, and ultraviolet (UV) disinfection. EPA will use the analytical and flow data included in this sampling episode report to evaluate the performance of the Zenon treatment system, and to analyze patterns and variability in wastewater sources.

Samples were collected in accordance with prodcedures specified in the *Generic Sampling and Analysis Plan for Large Cruise Ships in Alaska Waters* (Generic SAP) and the ship-specific *Sampling and Analysis Plan for Holland America Veendam* (Veendam SAP). The Veendam SAP is presented in Appendix E and the Generic SAP is available on EPA's website at http://www.epa.gov/owow/oceans/cruise_ships/GenericSAP040602.pdf. Pathogen indicator analyses were performed onboard. Samples for all other analyses were shipped to shoreside laboratories for analysis. Appendix D identifies all EPA-contract laboratories used in this sampling episode.

Section 2.0 of this report describes the generation, collection, and treatment of graywater and sewage on the Veendam, as well as the sampling point and flow meter locations used in this sampling episode. Section 3.0 describes the sample collection methods and deviations from the Veendam SAP. Section 4.0 presents and analyzes the analytical, flow, and shipboard data collected during the sampling episode. Section 5.0 describes the quality assurance and quality control (QA/QC) procedures and results. Section 6.0 presents references

used in this document. Tables and figures referred to in the text are located at the end of each section.